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ABSTRACT

The School District of Jennings, Missouri, undertook a study of the effectiveness of grouping on academic achievement in kindergarten. It was hypothesized that grouping children according to developmental lags would be beneficial to the subjects in terms of their academic and personal development; that the curricula would be partially responsible for these benefits; and that the students' academic performances would be related to family demographic, maternal attitudinal variables and perception of the child's behavior. Post-treatment scores obtained from 73 subjects revealed that of the demographic variables investigated, father's occupation and the number of brothers were the only ones significantly related to measured achievement. Maternal attitudes were not related. It was recommended that the study be replicated with better control of variables and cross-validated with different populations; that the subjects be followed through second grade; that the effect of kindergarten on self-concept growth and the relationship between maternal attitudes and family variables to achievement be further explored. References and appendixes containing a description of the test battery, parent questionnaire, and statistical analysis of study data are included. (Author/AJ)

Final Report

Project No. 0-F-014
Grant No. OEG-6-70-0009 (509)

# A PILOT STUDY OF A PRESCHOOL METHOD OF PREVENTIVE EDUCATION

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School District of Jennings

Jennings, Missouri

September 30, 1970

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Summary

Based upon suggestions from prior research the School District of Jennings, Missouri undertook a new program of education for the kindergarten classes of one of its elementary schools. The incoming pupils were screened prior to the opening of school on a number of variables thought to be significantly related to success in school. Based upon the results of this screening each child was assigned to one of three experimental classes: (1) a visual-motor class for children manifesting developmental lags in these skills; (2) an auditory discrimination class for children manifesting developmental lags in this skill; and (3) a cognitive class for children manifesting no significant developmental lags in visual-motor nor auditory discrimination and with at least an average IQ.

While grouping practices have been used and studied previously, the practice has been little used or studied in kindergarten situations. However, the literature suggests that with altered instructional techniques, the liklihood of grouping being bereficial would be greatest in kindergarten. The present study was undertaken to determine the validity of this suggestion. Specifically three hypotheses were put to experimental test.

1. Grouping of subjects would be beneficial to the subjects in terms of their academic and personal development.
   (a) That the curricula or treatment would be, at least in part, responsible for the benefits derived.
2. Children's academic performance would be related to family demographic, maternal attitudinal variables and to maternal perception of her child's behavior.
3. Working with the experimental program would lead to changes in teacher attitude and effectiveness.

In order to test the first hypothesis, an experimental-control group comparison design was employed. Data was analyzed by analysis of variance designs: analysis of covariance, with Sheffee's analysis of adjusted means, and Student's t tests. The second hypotheses was tested by means of Spearman's rank coefficient of correlation; Pearson product-moment correlation. The sample of subjects available for the third hypotheses was too small to evaluate statistically. Post-treatment scores were obtained from 73 experimental subjects (23 visual-motor, 25 each in auditory discrimination and cognitive) and 50 control subjects (16 each in visual-motor and auditory discrimination, and 18 in cognitive) on Wide Range Achievement Test (reading, spelling and arithmetic); a modification of the Wide Range reading test consisting of the word reading portion of it; Goodenough-Harris' Self drawing; and the Beery Test of Visual Motor Integration for the visual-motor groups, and two tests of auditory discrimination for those groups. The Mann-Whitney U

test was used to analyze the number of words read.

From the analysis of covariance, and the Sheffe analysis of the adjusted means, the following results were obtained. The experimental visual-motor group did not differ significantly from their control group on any of the measured achievement variables. The experimental visual-motor group tended to score significantly higher than their controls on the Test of Visual Motor Integration, but this tendency did not reach significance ($p = .10$). Similarly, the experimental auditory group did not differ from their controls on any of the achievement variables, except on the ability to read words ($p = .00003$) where the experimental group scored higher. The experimental cognitive group scored higher than their controls on all achievement variables (p estimated $= .05$), and on ability to read words ($p = .00003$). The experimental cognitive group accounted for most of the significance suggested bt the results of the analyses of covariance. The only significant difference in adjusted means for the Self drawings was that found favoring the control auditory discrimination group over the experimental auditory discrimination group (p estimated = .05).

It was suggested that, because of overlaps in some of the curricula used in the visual-motor and auditory discrimination groups, to which also the control group had been exposed, the above results should not be interpreted directly. Similarly, the data concerning the Self drawing scores are not amenable to a simple interpretation. Given certain qualifications, such as these, it was tentatively concluded that the grouping of these children, along with the alteration in instructional techniques, was probably beneficial. Although, its impact of the experimental subjects' self-concepts was not completely clear.

Of the demographic variables investigated, father's occupation and number of brothers were the only ones found to be significantly related ($p = .05$) to the children's measured achievement. Maternal attitudes were not found to be related to measured achievement. Of the four teachers and teacher assistants, three were found to have had a positive change in their measured attitudes and three were rated as more effective at the end of the program than was the case at the onset of the program. It was not clear that the improved attitudes were the direct result of their working with the experimental program.

It was recommended that the study be replicated with better control of the experimental variables and cross-validated with different populations. It was also recommended that the children in the study be followed through first and second grades in order to clarify whether or not the experimental procedures did indeed serve to prevent learning disabilities. The question of the effect of kindergarten on self-concept growth and change should also be further explored, as should the relationship between maternal attitudes and family variables to the child's achievement.

## Introduction

Drawing upon results from previous research, the School District of Jennings began a program of preventive education. The program involved the grouping of all of the children in one elementary school's kindergarten into three classes. The classes were based upon individual

screening of children for developmental strengths and weaknesses. The classes consisted of: (1) a group lagging in visual-motor development; (2) a group lagging in auditory discrimination development; and (3) a cognitive group for the facilitation of maximum skill development and independence. The program was aimed at providing the child with an initial school experience which avoided the frustrations, failure and anxieties that too often accompany the kindergarten experience; to make him ready for first grade, and thus to prevent the occurrence of avoidable learning disabilities and adjustment problems.

The National Education Association (1966) stated that "the development of intellectual ability and of intellectual interests is fundamental to the achievement of all the goals of American Education. Yet these qualities are greatly affected by what happens to children before they reach school" (1966, p.1). Implicit in this statement is that: (1) the years when the child is at home are crucial to his academic success; and/or (2) the "years before school" are exclusively those years at home. The first of these implications may have some validity, but such has not been established. As regards the second, Frostig and Maslow (1969) have suggested that the crucial years vary, depending on the skills that are to be developed. Moreover, they suggest that "education, especially education that takes place during early childhood, before school entrance and during the beginning school years, may modify abilities to a considerable degree. But such education has to be of a special kind. Education which focuses solely on academics will hardly influence the developmental abilities which underlie the ability to learn. Education must focus on each of these abilities directly in order to modify them optimally." Thus, such learning may not be "exclusive" to the home, but might be developed at school.

In an attempt to develop the ability to learn, the present project established the three classes, grouped on the basis of screened strength and weakness. The practice of grouping has been one of the tools used in education for some time. Although there has been a body of research built up through the years, the findings have not been entirely consistent. Ekstrom (1961), after reviewing the research from 1923 through 1958, cites the inconsistencies in both findings and methods, and she concludes that grouping is not sufficiently beneficial in itself, but that when it is accompanied by alteration in instructional methods it may be facilitative. Yates (1966) similarly provides an extensive review of the grouping literature. However, in both of these reviews, there is little research pertinent to the kindergarten situation. However, Yates, and Borg (1966) provide suggestions concerning the possible benefits of grouping in kindergarten. Grouping may be beneficial when there is also alteration in curricula and instruction, and when there is a focus upon specific skill areas. Under these conditions and a grouping regime, it may be anticipated that (a) brighter students will blossom when grouped with brighter students; (b) a sense of failure is avoided; and (c) there is better and more effective teaching. These potential benefits appeared to offer a sufficient promise to justify the inception of the experimental program.

All children who were to enter kindergarten were first screened with the McGilligan-Yater Kindergarten Battery (MYK). The tests included in this battery provide scores on the following factors: visual-motor skills, auditory discrimination, vocabulary, number skills,

orientation skills, intelligence, self-concept, and emotional maladjustment in a gross sense. On the basis of the obtained scores on the MYK Battery, pupils were assigned to one of three classes: (1) for children with a developmental lag in visual-motor skills; (2) for children with a developmental lag in auditory discrimination; and (3) for children with no significant lags in visual-motor nor auditory skills and at least an average IQ--labled the cognitive class. During the time each child was individually tested, his or her mother was also requested to provide certain kinds of information. The mothers completed a rating scale, which provided a behavioral evaluation of her child (Yater, 1967) and a demographic-health form. The Parental Attitude Research Inventory (Schaefer and Bell, 1958) was also obtained from a sample of mothers subsequent to the beginning of the school year.

During the month of August, a group of pre-kindergarteners at a different elementary school in the District was enrolled in a summer program. During the course of this program the participants were also screened with the MYK Battery. The mothers of this group were also asked to provide the information on the demographic-health form. This group of children constitutes the control group. Statistical techniques were employed in order to control for achievement-related variables which might produce non-experimental sources of variance between the experimental and control groups. During the school year, the control group subjects were assigned to kindergarten classes based on residence, rather than grouping of any kind. They received the curricula which had been typically employed at this school in previous years.

For each of the experimental classes, an experimental curricula was developed. Basically, two instructional programs were established. For the cognitive group, the curricula was determined to a great extent by the already existing skills of the children, and by the goal of developing independent study skills. The curricula for the developmental lag groups--visual-motor and auditory--took two approaches: (1) teaching at the weakness in order to foster its more rapid development; and (2) teaching through a strength in order that the subjects would be able to learn in a compensatory fashion. While every effort was made to keep the classroom techniques and materials flexible, both as to the class and the individual, there were certain overriding goals for each of the three classes. For the visual-motor class the goals were to develop physical coordination, eye-hand coordination, form constancy, perception of position in space, figure-ground relationships and spatial relationships. In the auditory group, the goals were to develop rhythm, ease of self-expression, pitch, length of sounds, identification of sounds and discrimination of types of sounds. The goals for the cognitive group were to develop writing, beginning reading, beginning math, choral reading, poetry and independent work habits In addition, all three groups received instruction aimed at developing language skills, art and music and the social learning which occurs during playtime activities.

The entire program was intended to be flexible. Thus no child, or group of children were begun on a program of instruction until they were judged to be ready for the instruction. Usually this judgement was determined by the teacher, who often consulted a guidance counselor and consulting psychologist. In addition, however, each child was allowed to develop at his maximum rate and as far as his abilities would permit.

Thus, two children who entered kindergarten with reading skill were not required to endure beginning reading instruction. Similarly, a child or group of children who were judged not to be ready for instruction in beginning reading were never placed in that kind of instructional program.

The experimental procedures were carried out by two experienced kindergarten teachers (one teacher conducted two classes). In addition each of the classes enjoyed the services of a one-half time teaching assistant. These teaching assistants actually conducted classroom activities and, under the teacher's direction, conducted learning groups. During the first three months of the program, a student teacher was assigned to the visual-motor and the cognitive classes. Throughout the entire seven months of the program a guidance counselor and consulting psychologist were regularly available for conferences with the teachers and teacher assistants. Indeed such conferences were held nearly every week. The purpose of these conferences were to provide training for the teaching staff where needed; to examine the instructional needs of groups or individuals; to monitor the progress or lack of progress of individual children; and in general to act as a facilitative group to enhance the success of the program.

In order to evaluate the effect of the several aspects of the program, a program of research was also carried out. While the overall aim of the research evaluation was to determine the success or lack of success of the experimental procedures, there were certain specific hypotheses which were examined.

1. It was hypothesized that the grouping of the subjects would be beneficial to the subjects in terms of their academic and personal development.
   (a) It was further hypothesized that the curricula or treatment would be, at least in part, responsible for the benefits derived.
2. It was hypothesized that the child's academic performance would be related to family demographic, maternal attitudinal variables and to maternal perception of her child's behaviors.
3. It was hypothesized that working with the experimental program would lead to changes in teacher attitude and teacher effectiveness.

Of course, in examining these hypotheses they were tested in the null form.

## Methodology

Subjects: The original pool of experimental kindergarteners may be divided into two groups based on the time of initial screening. One group 68 children was screened during "Enrollment Week" in the month of May prior to their entrance into kindergarten. A second group was screened one week prior to the September entrance into kindergarten and numbered 23. From this group of 91 children only 73 experimental subjects were available for data analysis, i.e., data was available from the screening and the post-experimental testing. The original pool of control group children numbered 51, and the final group was 50. The control group was screened, and judgements were made on the same basis as the experimental group as to which of the three experimental classes

they might have been assigned to. In this way there was a control group for each of the three experimental groups. The breakdown of subjects per group was as follows:

| | Visual-motor | Auditory | Cognitive | Total |
|---|---|---|---|---|
| Experimental | 23 | 25 | 25 | 73 |
| Control | 16 | 16 | 18 | 50 |

The original groups (91 and 51) did not differ in terms of their mean chronological age at the time of testing. For the experimental group the mean age was 61.89 months (s.d. ≤ 4.27), and for the control group it was 62.96 months (s.d. = 3.24). The groups also did not differ in terms of measured IQ which was 105.81 (s.d. = 15.31) for experimentals and 105.28 (s.d. = 13.43). Of the MYK variables, the groups differed in ability to count objects; experimental mean of 5.64 (s.d. = 2.96) and control mean of 6.70 (s.d. = 2.69), yielding a t value of -2.150 (two-tailed p ≤ .05). They also differed on all three of the Goodenough-Harris Drawing Test forms as follows:

| | | Mean | s.d. | t's |
|---|---|---|---|---|
| Man | E | 87.11 | 14.55 | 4.051 * |
| | C | 78.23 | 8.57 | |
| Woman | E | 84.67 | 14.24 | 4.195 * |
| | C | 75.81 | 7.55 | |
| Self | E | 83.46 | 13.33 | 4.860 * |
| | C | 73.62 | 8.22 | |

*All two-tailed p's ≤ .01

In the experimental group there were 48 boys (52%) and 43 girls (48%), while in the control group there were 23 boys (45%) and 30 girls (55%). The experimental group contained a smaller proportion of drawings with signs of maladjustment (25% with two or more signs) than the control group (34%). The combined group consisted of Caucasian subjects from socio-economic status which ranged from lower class to upper-middle class.

The demographic data on the subjects' families also manifested some differences. In general, the mothers and fathers were older (father t = 2.128; df = 100; p ≤ .05 and (mother t = 1.672; df = 100; p = .10) than the control group. The parents of the control group were less well educated; the fathers were employed in lower status jobs; but showed somewhat greater family stability in terms of intact natural families. The control group reported lesser residential stability, with greater residential mobility, possible within the greater metropolitan area (St. Louis) of which Jennings is a part.

Instruments and Measures: In order to gather the data for the project several standardized and experimental measures were utilized.

The McGilligan-Yater Kindergarten Battery (MYK) consists of a compilation of published, modified and experimental tests. It was specifically designed to permit, in part, the screening and class assignment of children at the experimental school (See Appendix A). The MYK Battery provides scores on the following variables: intelligence; vocabulary; number--counting objects and--digital expression; visual orientation--size, high/low, and position; visual-motor (designs copying); social adjustment; signs of maladjustment, and body concept. In addition it includes a "General Information Record" on which demo-

graphic and health data are recorded. The battery is an experimental battery, but the reliability and validity of some of the tests included have been reported elsewhere. The reliability and validity of the remaining tests included remain to be empirically verified.

In order to make the assignment of children to one of the three experimental classes three index scores were derived from the battery. The visual-motor index consisted of the sum of the ranks of scores on number, orientation and designs-copying tests. The auditory discrimination index consisted of the sum of the ranks of scores on the auditory discrimination tests. The cognitive index consisted of the sum of the ranks of scores on IQ and vocabulary. In general, the lowest index scores for visual-motor and auditory discrimination were assigned to their respective classes. Assignment to the cognitive class was based on the highest cognitive index and the other subjects who manifested no low index scores for visual-motor or auditory discrimination scores.

The battery was factor analyzed by the principal components method and the factors were rotated to a varimax solution. This yielded five significant factors from the screening data. Among these factors was one which has been tentatively labeled a "maturation factor." This factor had significant loadings from three variables: chronological age (loading -.73), designs copying (-.65), and Articulation of Body Concept (.65). This factor was employed as a part of the index covariate in the analyses of the achievement data to equate the experimental and control groups on level of "maturation" at the time of the initial screening. Analysis of variance of the "maturation" factor yielded the following results.

| Source | S.S. | df | M.S. | F | p ≤ |
|---|---|---|---|---|---|
| Total | 3762.85 | 122 | | | |
| E versus C | 15.62 | 1 | 15.62 | ---- | |
| Class | 713.25 | 5 | 142.65 | 6.94 | .01 |
| Interaction | 752.84 | 5 | 150.57 | 7.33 | .01 |
| Error | 2281.14 | 111 | 20.55 | | |

Sheffee's analysis of the means (McNemar, 1962, p. 286) indicated that there was no significant difference between the experimental means and the control means, nor between experimental and control groups when analyzed by class placement (visual-motor, auditory, or cognitive). The significant mean differences, in general, occurred between comparisons of visual-motor groups (lowest) and cognitive groups (highest) with the remaining respective groups.

Two measures were used to assess teacher attitude and effectiveness. The Minnesota Teacher Attitude Inventory (Cook, Leeds and Callis, 1961) is a 150 item forced-choice questionnaire or inventory of attitudes. The Inventory was administered to the two teachers and teacher assistants of the experimental classes at the beginning of the experiment, and again at the end. As a measure of teacher effectiveness, the School District of Jennings' Teacher Evaluation Report was used with modified scoring. A maximum favorable (superior) score on each of the 17 items would yield a total score of 51, with a minimum of 17. Rating each item at the middle of the three point scale (satisfactory) would yield a score of 34. The ratings were completed on all experimental teachers and teacher assistants by a guidance counselor at the

beginning and at the end of the experimental program.

A short-form of Schaefer and Bell's (1958) Parental Attitude Research Inventory was obtained from a volunteer group of 24 mothers and 14 fathers of experimental children. The number of father forms was considered too small a sample for meaningful analyses, and thus was not used. There were only three mothers who completed the form whose children were in the visual-motor class, so these were combined with the forms of the mothers of children in the auditory discrimination class. Thus, there were two groups; 10 from the cognitive class and 14 from developmental lag classes. The Parental Attitude Research Inventory (PARI) yields scores on three factorially derived scales: (1) authoritarian control; (2) democratic attitudes; and (3) hostility-rejection.

Mothers also provided a rating on the Child Rating Scale (Yater, 1967). This scale is a 54 item true-false instrument which asks the rater to indicate whether or not the child manifests several behaviors. Scores may range from zero to 54, with 54 representing the more problem-free extremity. In all, 62 mothers completed the Child Rating Scale; 17 visual-motor, 20 auditory and 25 cognitive. Preliminary analysis yielded a mean score of 42.66 (s.d. = 9.54) which is extremely skewed in the problem-free direction. Preliminary attempts to analyze this data in conjunction with the children's achievement proved to be of little value. Thus, the data from the Rating Scale was not included in the analyses.

The Wide Range Achievement Test was administered to all experimental and control subjects one week prior to the end of the school year. The Wide Range Achievement Test (Jastak and Jastak, 1965) yields raw scores and grade equivalent scores for reading, spelling and arithmetic. The Wide Range Achievement Test (WRAT) was also administered to a sample of both experimental and control subjects as part of the mid-term evaluation. This experience with the WRAT revealed that many of the children who could read words were not able to score high enough on the reading subtest to reflect this ability. In order to attain the word reading level, a subject is required to obtain 15 points based upon knowledge of letters of the alphabet. Thus, in addition to the standard WRAT administration, each child was given an opportunity to read the words in the word reading section, whether he had attained 15 points or not. The scores on this additional test are labeled "Words Read" and one point was given for each correct word read. In the data analyses raw scores were used rather than grade equivalents for statistical considerations.

Also during the close of the school year two tests of auditory discrimination were administered. One, the short form was the same test that was used in the MYK Battery. The short form had a maximum score of 27, for 27 word-pairs. Also administered was a longer form of the same test which had a maximum score of 90, for 90 word-pairs. The long form was added because the scores on the initial administration of the short form were very close to the maximum. It was felt that the long form would thus, allow greater discrimination, and would allow for a higher ceiling for those subjects whose auditory discrimination had improved. The Self drawing from the Goodenough-Harris Drawing Test (Harris, 1963) and the Beery Test of Visual-motor Integration were also administered.

In all cases, these instruments were administered by experienced examiners in either individual or group administrations depending upon the nature of the test. Administration and scoring procedures followed those provided by the authors of the tests.

## Results

Basically three hypotheses were examined by an assortment of statistical procedures, which will be described as the results are developed. In general terms, however, the statistical techniques employed utilized analysis of variance and correlational approaches.

Hypothesis One: The first hypothesis was designed to determine whether the grouping of the experimental subjects was beneficial and whether the presumed benefits could be attributed to the experimental alteration of the instructional methods used. As was mentioned previously, the two groups--experimental and control--differed only in the pre-treatment variables having to do with ability to count objects, and on the Goodenough-Harris Drawing Test. Also previously indicated were differences on the Maturation Index. In a correlational analysis of the relationship between deomgraphic variables and achievement variables revealed that only "father's occupation" was significantly related to all of the post-treatment variables, except the Goodenough-Harris Self drawing. Thus, in examining the achievement variables an analysis of covariance design was utilized (Winer, 1962). In these analyses, a covariate index was employed, which consisted of the object counting, maturation index and father's occupation variables. In order to derive the maturation index score, each subject's chronological age, score on Developmental Designs copying and score on Articulation of Body Concept was multiplied by its respective factor loading (rotated loadings were used). Each subject's score on each of the three variables were then divided by the standard deviation for that variable. These values were then summed to obtain the covariate index (Edwards, 1950, p. 299).

A separate analysis of covariance, using unweighted means solutions, was computed for each of the WRAT sub-tests--reading, spelling and arithmetic. A factorial design was employed in order to compare each experimental group with its control group and simultaneously compare the total experimental and control groups. Table 1, reports the analysis

Table 1. Analysis of Covariance of Reading Scores

| Source | S.S. | df | M.S. | F | p ≤ |
|---|---|---|---|---|---|
| Group | 150.16 | 1 | 150.16 | 3.198 | .10 |
| Treatment | 528.42 | 2 | 264.21 | 5.627 | .01 |
| Interaction | 356.24 | 2 | 178.12 | 3.793 | .10 |
| Error | 5445.78 | 116 | 46.95 | | |
| Total | 6480.60 | 121 | | | |

of the reading scores of the WRAT. The interaction factor was not of specific interest but was computed as part of the overall design. The analysis of variance of the reading scores (see Appendix D), unadjusted for the effects of the covariate index yielded a non-significant F for the Group factor (F = 1.732), but a significant value for the Treatment

factor ($F = 9.930$; $p \leq .001$). Table 2 presents the means for each group, both prior to and after adjustment for the effect of the covariate. As

Table 2. Unadjusted and adjusted means of reading scores.

| | Unadjusted | | | Adjusted | | |
|---|---|---|---|---|---|---|
| | VM | AD | C | VM | AD | C |
| E | 20.26 | 25.32 | 33.08 | 22.57 | 24.25 | 31.68 |
| C | 22.19 | 24.44 | 26.00 | 23.31 | 24.47 | 24.61 |

can be seen in Table 1, there were significant differences in the Treatment means, while the Group and Interaction factors were not significant. In order to determine which means differed significantly from which other means, Sheffee's analysis was conducted. When two means were compared, a difference of 6.91 points was required to reach significance (Sheffee suggests the .10 level be used instead of the customary .05 level because of the relative insensativity of his test to differences). As can be seen in the adjusted means of Table 2, only the comparison of the experimental and control Cognitive group was significant, although the experimental Cognitive group was significantly different from each of the other groups as well. In comparing groups of two or more means, Sheffee's test requires a difference of 3.81 points in order to be significant. On this basis the comparison of the total experimental group with the total control group yielded a difference of only 2.11. Other comparisons of interest were calculated but only the total cognitive (experimental plus control) differed from the total auditory discrimination (4.38) and from the total visual motor (5.85) groups. (Appendix B shows the conversion of adjusted means into WRAT equivalent scores).

In exactly the same manner analysis of covariance techniques were applied to the spelling sub-test scores. Table 3 presents a summary of

Table 3. Analysis of covariance of spelling scores.

| Source | S.S. | df | M.S. | F | p ≤ |
|---|---|---|---|---|---|
| Group | 98.98 | 1 | 98.98 | 7.684 | .01 |
| Treatment | 79.02 | 2 | 39.51 | 3.068 | .10 |
| Interaction | 105.22 | 2 | 52.61 | 4.085 | .05 |
| Error | 1492.78 | 116 | 12.88 | | |
| Total | 1776.00 | 121 | | | |

this analysis. Analysis of the unadjusted means (Appendix D) on the spelling variable yielded an F for the Group factor of 3.592 ($p \leq .10$) and for the Treatment factor of 6.822 ($p \leq .01$). Sheffee's analysis of the adjusted means, which are presented in Table 4, required a two-mean

Table 4. Unadjusted and adjusted means of spelling scores.

| | Unadjusted | | | Adjusted | | |
|---|---|---|---|---|---|---|
| | VM | AD | C | VM | AD | C |
| E | 16.96 | 19.80 | 23.92 | 18.48 | 19.49 | 23.00 |
| C | 18.19 | 18.38 | 19.11 | 18.93 | 18.40 | 18.19 |

difference of 3.65 and a group-mean difference of 1.98 to be significant. As can be seen in Table 4, only the experimental cognitive group differed significantly from each of the other groups, except the experi-

mental auditory discrimination group. The total experimental group did not quite differ significantly from the total control group (difference = 1.88). The total cognitive group did however, differ from the auditory group (1.93); from the visual-motor group (2.33) and from the combined total auditory and visual-motor groups (2.12).

Similarly, the arithmetic scores of the WRAT were analyzed, the summary of which is presented in Table 5. All three factors, Group,

Table 5. Analysis of covariance of arithmetic scores.

| Source | S.S. | df | M.S. | F | p ≤ |
|---|---|---|---|---|---|
| Group | 101.39 | 1 | 101.39 | 8.379 | .01 |
| Treatment | 208.22 | 2 | 104.11 | 8.604 | .01 |
| Interaction | 968.82 | 2 | 484.41 | 40.034 | .001 |
| Error | 1403.13 | 116 | 12.10 | | |
| Total | 2681.56 | 121 | | | |

Treatment, and Interaction, were significant. The analysis of variance of the unadjusted means (Appendix D), yielded a Group F of 5.368 ($p \leq .05$) and a Treatment F of 11.563 ($p \leq .001$). The respective arithmetic means are presented in Table 6. Sheffee analysis of the

Table 6. Unadjusted and adjusted means of arithmetic scores.

| | Unadjusted | | | Adjusted | | |
|---|---|---|---|---|---|---|
| | VM | AD | C | VM | AD | C |
| E | 15.04 | 16.44 | 22.56 | 16.56 | 16.13 | 21.64 |
| C | 14.94 | 15.94 | 17.17 | 15.68 | 15.96 | 16.25 |

adjusted means required a two-group mean difference of 3.52 and a group-mean difference of 1.92. As regards the two-mean comparisons, the experimental cognitive group differed significantly from each of the other groups, but these groups did not differ from each other. The total experimental group was significantly different from the total control group (difference = 2.18). Examining other combination of group means indicated that the total cognitive group differed significantly from the total visual-motor group (3.18), the total auditory group (3.32) and from the combined total visual-motor and total auditory (3.25).

In each of the sub-test analyses above, the experimental cognitive group was also compared with the total of all other groups combined. The result yielded a significant difference in each case: reading, 7.88; spelling, 4.26; and arithmetic, 5.49. In fact, these latter differences are greater than any of the other group-mean comparisons for each of the sub-tests.

An analysis of variance was also computed on the covariate used in the above analyses. The summary of this analysis is presented in Table 7. As can be seen, only the Treatment factor reached a significant level. A Sheffee's analysis of the means, which are presented in Table 8, indicated that no two-group mean reached the 11.36 difference required. The total experimental group did not differ from the total control group (difference = .50), in that a group-mean difference of 6.08 was required. The total cognitive group was higher

Table 7. Analysis of variance of covariate index.

| Source | S.S. | df | M.S. | F | p ≤ |
|---|---|---|---|---|---|
| Group | 8.00 | 1 | 8.00 | | |
| Treatment | 1,018.20 | 2 | 509.10 | 4.220 | .05 |
| Interaction | 78.40 | 2 | 39.20 | | |
| Error | 14,114.75 | 117 | 120.64 | | |
| Total | 15,219.35 | 122 | | | |

Table 8. Means and standard deviations of covariate index.

| | VM | AD | C | VM | AD | C |
|---|---|---|---|---|---|---|
| Mean | 50.65 | 56.97 | 59.08 | 53.36 | 55.83 | 59.06 |
| S.d. | 16.68 | 23.16 | 4.51 | 13.80 | 5.83 | 3.86 |

than the total visual-motor group (7.31). The combined total auditory and total cognitive groups were higher than the total visual-motor group, almost reaching a significant level (6.07).

Because of the distribution of scores and the frequency of zero scores on the Words Read mosification of the WRAT, the Mann-Whitney U test was used to analyze these scores. The particular application of the Mann-Whitney U test was that for a sample size of more than 20 subjects in one of the samples (Siegel, 1956, Pp. 120-216), with correction for tied scores. The visual-motor group were able to read such a small number of words (only 9 words for the whole group) that the analysis excluded this group. In comparing the experimental and control auditory discrimination groups a U of 359 was obtained, which yielded a z value of 4.309 ($p \leq .00003$). Similarily, in comparing tje cognitive experimental and control groups the obtained U of 345.5 yielded a z of 9.503 ($p \leq .00003$). Both of these quite significant differences were in the direction of greater words read by the experimental groups.

Besides testing the achievement attained by these subjects, certain of them, namely the experimental visual-motor and auditory discrimination groups, also were provided with instruction aimed at assisting them in overcoming their developmental lags. In order to examine the effect of this teaching-at-the-weakness technique, Beery Visual Motor Integration and two auditory discrimination test scores were analyzed by means of the unrelated Student's test (Guilford, 1965, p. 183).

It may be recalled that there were no significant differences on the visual-motor tests' scores prior to the treatment. The means for the visual-motor groups on the Beery, given after treatment were 10.35 (s.d. = 2.87) for the experimentals and 9.56 (s.d. = 2.06) for the controls. With tabled degrees of freedom of 35, this yielded a t which tended to be, but did not reach significance ($t = .920$; $p \leq .10$).

Similarly the pre-treatment scores of the auditory discrimination groups did not differ on the short form of the auditory discrimination tests. Table 9 presents the means and standard deviation for the

Table 9. Means and standard deviations of post-treatment short and long auditory tests.

| | E | C | E | C |
|---|---|---|---|---|
| Mean | 22.12 | 21.88 | 79.68 | 73.94 |
| S.d. | 4.46 | 3.48 | 9.86 | 7.77 |
| | Short | | Long | |

experimental and control groups on both forms after the treatment. The two groups did not differ on the short form (t = .245; df = 35). On the long form there was a significant (one-tailed) difference (t=1.928; p ≤ .05; df = 35); experimental group was higher.

The Goodenough-Harris Self Drawing (Harris, 1963) was utilized as a measure of self-concept or self-image. It was felt that the self drawing reflected a knowledge of one's own body image and thus awareness of and attention to the self. As was indicated previously, the experimental and control groups differed significantly on the first (pre-treatment) administration of the Self Drawing (DAS). Because of this difference, the DAS was used as a covariate in the analysis of covariance of the post-treatment Self Drawing (DAS'). Table 10 presents a summary of the analysis, and Table 11 the unadjusted and

Table 10. Analysis of covariance of Self Drawings.

| Source | S.S. | df | M.S. | F | p ≤ |
|---|---|---|---|---|---|
| Group | 1,490.37 | 1 | 1490.37 | 19.305 | .001 |
| Treatment | 50.14 | 2 | 25.07 | | |
| Interaction | 3,556.16 | 2 | 1778.08 | 23.032 | .001 |
| Error | 8,878.21 | 115 | 77.20 | | |
| Total | 13,974.88 | 120 | | | |

adjusted means of the post-treatment scores. A Scheffee's analysis of the adjusted means was carried out, which required a two-mean difference

Table 11. Unadjusted and adjusted means of Self scores (DAS').

| | Unadjusted | | | Adjusted | | |
|---|---|---|---|---|---|---|
| | VM | AD | C | VM | AD | C |
| E | 81.09 | 90.16 | 92.48 | 81.75 | 86.05 | 87.77 |
| C | 88.88 | 89.00 | 87.50 | 83.60 | 92.37 | 91.02 |

of 8.93, and a group-mean difference of 4.86 to reach the .10 level of significance. The auditory discrimination control group was significantly higher than the visual-motor experimental group (difference = 10.62); the other groups did not differ from each other. The total experimental and control groups did not differ significantly (3.80). The visual-motor groups appeared to account for most of the difference in means. The experimental visual-motor group differed from the combination of experimental auditory and cognitive groups (5.16). Similarly, the control visual-motor group differed from the rest of the control subjects' mean (8.06). The total visual-motor group differed from the total auditory group (6.01) and the total cognitive group (6.62), as well as from the combination of all other groups )6.32).

Hypothesis Two: The second hypothesis was designed to determine whether there was a relationship between the subject's academic performance and his family demographic data, and maternal attitudes regarding child rearing practices. In order to test the first part of this hypothesis, Spearman rank coefficients of correlation were computed between demographic and achievement variables, for the total experimental and control group. Table 12. presents these coefficients. As can be seen Father's occupation was significantly related to all achievement variables. Father's occupation was also significantly related to

Table 12. Correlations between demographics and achievement.

| | Read | Spell | Arith | Words Read |
|---|---|---|---|---|
| Father's age | -07 | -16 | 05 | -01 |
| Father's occupation | 21* | 23* | 23* | 21* |
| Father's education | 07 | 13 | 17 | 15 |
| Mother's age | -02 | -09 | 07 | 06 |
| Mother's occupation | -07 | -04 | 05 | -01 |
| Mother's education | 11 | 11 | 04 | 09 |
| Marital Status of Natural Parents | 03 | 12 | -02 | 01 |
| Adult male in the home | 11 | 10 | 01 | 09 |
| Adult female in the home | -14 | -04 | -13 | -10 |
| Number of brothers | -26* | -11 | -21* | -13 |
| Number of sisters | 06 | 07 | 08 | 11 |
| Years lived in Jennings | 10 | 02 | 17 | 12 |
| Residence prior to Jennings | -13 | -01 | -17 | -20 |

* Significant at the .05 level. Decimals omitted.

Beery scores (.24) and to auditory scores (short, .22; long, .22). Also the number of brothers in the subject's family was significantly related to reading and arithmetic scores.

A sample of 24 mothers of experimental group subjects completed the short form of the Parental Attitude Research Inventory (PARI). The total group was divided into a cognitive group (N = 10) and a developmental lag group (N = 14). The latter group was composed of 11 from the auditory discrimination group and 3 from the visual-motor. Table 13 presents the means and standard deviations for these two groups.

Table 13. Means and standard deviations of PARI factor scores.

| | | Cognitive | | Lag | |
|---|---|---|---|---|---|
| | | M | s.d. | M | s.d. |
| I | Authoritarian Control | 104.10 | 16.91 | 117.42 | 16.65 |
| II | Demographic Attitudes | 50.20 | 5.32 | 49.43 | 4.24 |
| III | Hostility-Rejection | 21.60 | 3.20 | 23.93 | 4.27 |

Student's tests, and Fratios, were computed for each PARI factor between the two groups. In no case were the t's significant. Because the two groups did not differ in terms of means, nor in terms of variance, they were pooled into one group. Coefficients of correlation were then calculated between each PARI factor and the three WRAT subtests. The results of this analysis are presented in Table 14.

Table 14. Correlations between PARI and achievement scores.

| | | Read | Spell | Arith |
|---|---|---|---|---|
| I | Authoritarian Control | .04 | -.09 | -.24 |
| II | Demographic Attitudes | .01 | -.00 | .07 |
| III | Hostility-Rejection | -.13 | -.19 | -.22 |

As can be seen, none of these relationships were significant in that a

Pearsonian coefficient of .40 would be required at the .05 level of confidence.

Hypothesis Three: The third hypothesis was intended to determine whether the experimental program would have an impact upon the teachers' attitudes and effectiveness. The raw scores of the teachers and teacher assistants on the Minnesota Teacher Attitude Inventory (MTAI) and the Jennings Teacher Evaluation Report (TER) are reported in Table 15. As

Table 15. Raw scores of the MTAI and the TER

| | MTAI | | TER | |
|---|---|---|---|---|
| | Pre- | Post- | Pre- | Post- |
| Teacher 1 | 57 | 85 | 35 | 37 |
| Teacher 2 | 40 | 45 | 29 | 22 |
| Teacher Asst. 1 | 45 | 65 | 36 | 42 |
| Teacher Asst. 2 | 65 | 45 | 36 | 42 |

regards the MTAI, three of the teaching staff members scores were higher on the post-treatment test, and one was lower. The TER showed that three teachers ratings were higher on the second rating, and one was lower. Because of the small size of the sample no statistical techniques were really applicable.

## Discussion

Visual-motor: The visual-motor groups, either experimental or control, appeared to be poorest of the three groups, regardless of the measure applied. A part of this may be due to an artifact of the placement or grouping procedures. The visual-motor group may have been a more hetrogeneous group than the others, containing subjects relatively lower in intelligence, others lower in emotional adjustment, others lower in maturation and/or academic skills, in addition to pure visual-motor lags. Or it may be that the visual-motor tests are such that they include these other types of problems. Whatever, the case, the visual-motor group seem to have the greatest difficulty in school learning. The experimental group did not differ from the control group on any of the WRAT achievement measures.

While on the basis of the results it may appear that the experimental procedures had little beneficial affect upon these subjects, such may be an over-simplification. The experimental procedures were in effect from November through May. Many of the visual-motor activities used in the experimental class were also used with the control group during their summer program prior to kindergarten, and may have been used somewhat during the regular kindergarten curricula. Furthermore, while beginning reading and arithmetic were begun during January with the control group, these were not begun in the experimental group until March. In fact, some of the experimental group subjects were not given this instruction at all. Thus, it may be concluded that the experimental procedures had no detrimental effect upon the subjects, in that they were able to learn as much as the control group despite these differences. In fact, the experimental group learned the reading and arithmetic in a shorter amount of time.

Another consideration deals with the teaching at the weakness.

The experimental group tended to perform better on a test of visual motor integration than the controls, although this difference did not reach significance. It might be speculated that these children were helped to begin to improve their visual-motor skills, and that such improvement may have lead to more rapid learning than was the case with the control group. If it could be assumed that the more rapid rate of academic learning and visual-motor development would continue to favor the experimental group, then it would appear that the expermental procedures would indeed have had merit. Of course, however, the test of such an assumption must await further investigation, and follow-up studies.

Auditory Discrimination: In terms of pre-treatment screening, post-treatment evaluation, or achievement, the middle group was the auditory discrimination group, with the exception that it was the lowest on measures of auditory discrimination. The experimental group did not differ in WRAT reading scores from the control group, but was able to read words at a quite significantly higher rate than were the controls. The experimental group did not differ on the spelling, nor on the arithmetic sub-test scores. As was the case with the visual-motor group, however, the major emphasis in the experimental auditory group was placed upon learning through compensatory measures, and development of the undeveloped auditory skill. For example, the experimental group learned to read through a primarily visual mode, which incidentally aided in auditory skill development, which stressed the use and recognition of words. The control group, on the other hand was instructed through one of the more traditional alphabet and phonic approaches. Thus, it was not unexpected that the experimental group would do much better than the control group on Words Read.

Looking at the auditory group from the weakness point of view, the experimental group was significantly better able to discriminate auditorially than the control group subsequent to the experimental treatment. Thus, the experimental procedures appeared to be successful in both fostering the development of compensatory learning and the growth of auditory discrimination skills, at least as regards reading. The experimental procedures appeared to have had no inhibiting effect on spelling and arithmetic.

Cognitive: The cognitive group was the high scoring group on all of the measures used. On all of the post-treatment measures the experimental cognitive group had significantly higher scores than the control group. In fact, of all of the group comparisons this comparison was the most dramatically favorable. It seems fairly clear that the experimental procedures used with the cognitive group were directly beneficial to the academic achievement of the experimental group. The control cognitive group in fact performed no better than the auditory group on the achievement measures. The control cognitive group, in the absence of the experimental procedures was not allowed to develop the learning potential that would have been expected from their pre-treatment test scores.

Experimental and Control Groups: In comparing the total experimental and total control groups, there were no significant differences in reading nor spelling, but the experimental group did differ from the

control group on arithmetic. It might be concluded that the mere practice of grouping children in kindergarten would not be beneficial. What is required is grouping with altered instructional techniques. Of course, subsequent evaluation of these groups, when they are in first or second grade might present a more definitive answer to this question. At least it may be concluded that the interaction of grouping and altered instruction was certainly beneficial for the experimental cognitive group, probably beneficial for the experimental auditory group, and questionably beneficial for the experimental visual-motor group, in terms of their achievement test scores.

Developmental Lags: In looking at the experimental procedures' impact on the developmental lags manifested by the visual-motor and auditory groups, the data indicated that the procedures may have been beneficial. The experimental visual-motor group tended to score significantly higher on the post-treatment measure of visual motor integration. It might be speculated that had the control group not been exposed to many of the same procedures, this difference would have been significant. Thus, it may be cautiously said that the experimental procedures were beneficial. Similarly, that the experimental auditory group scored significantly higher on the post-treatment measure of auditory discrimination. Had the control group been exposed to none of the experimental procedures, this difference might have been even more significant. It may be concluded, although not without some qualification, that the experimental procedures were beneficial in fostering the more rapid growth of skills which had been shown to be lagging in development. Without these procedures these children may have continued to experience difficulties in learning as a result of inadequateley developed skills.

Self-concept: The experimental program was intended to provide a kindergarten experience which would avoid the feelings of failure and frustration which probably occur as a result of traditional kindergarten programs. It was felt that the impact of traditional programs upon children would appear in terms of diminished self-concept, a variable important to learning. The Goodenough-Harris Self Drawing was used as a measure of the subjects' self-concepts. It should be noted, however, that there is no empirical validity on this approach to the measure of self-concept. Furthermore, it is probable that the Goodenough-Harris Drawing Tests measure something other than a simple, single variable. Nevertheless, the data indicated that the control group showed a greater gain in Self scores from the pre- to the post-treatment testing.

Comparing each of the three experimental-control groups yielded no significant differences. Were the changes in mean scores of each group to be plotted pictorially, it would appear that, with the exception of the experimental visual-motor group, all of the groups tended to converge in an area between 87.50 and 92.48. Comparing the highest group with the lowest group in this area (experimental cognitive and control cognitive) a mean difference of 4.98 points would be obtained. In that the control group initially had significantly lower scores, their more rapid gains may have been due to internal growth forces toward "normality," at least for this entire group.

An alternative way of looking at this data would be in terms of the effect of the experimental procedures on the self scores of the subjects. In this regard, the experimental procedures could have had an inhibitory effect on the experimental subjects' growth in self-concept. This effect would have been greatest on the experimental visual-motor group, which showed the least amount of gain. It is not clear how such an effect would arise, particularly with children with no previous school experience. A third alternative would be that the teacher's attitudes could have either an inhibiting or a facilitating effect on self-concept growth. This possible alternative was investigated with a sample of children from each of the experimental and control classes. Their self scores were compared with the attitudes of the teachers involved. While there was a tendency ($p \leq .10$) for the experimental teachers' pupils to have lower scores than the teachers of the control group subjects, this tendency was not significant. The data, thus, are not able to support any of these three alternatives.

Home and School: The relationships between the demographic data of the subjects' families and their mothers' attitudes regarding child rearing practices were also investigated. The data indicated that, of the demographic data, only the father's occupation was significantly related to the child's achievement, and that number of brothers was significantly related to reading and arithmetic achievement. It was noted also that father's occupation was also significantly related to scores on tests of visual motor integration and auditory discrimination. For purposes of this study, father's occupation was scaled from unemployed (=0) to professional (=7). These data were not expected. It would have been anticipated that the demographic data would have shown greater relationship to the child's achievement. It is not clear how the role of the father's occupation and number of brothers could be related to achievement, as they were in this study. The attitudes of the mothers were not related to any of the achievement variables.

Teacher Variable: It is difficult to asses the changes of the teachers and teacher's assistants on the measures of attitudes and effectiveness. It was anticipated that the facilitative team, consisting of the guidance counselor and consulting psychologist, would have lead to improved attitudes and effectiveness through their working closely with the teaching staff. While there were gains in the attitudes of the teaching staff, except for teacher assistant #2, the expressed attitudes did not support these changes. Further, such changes in attitudes as 28 points suggests, would not have been expected in that attitudes are presumed to reflect characteristics which are relatively stable, and resistant to change. Also, there were three of the teaching staff who had higher post-treatment scores on teaching effectiveness. Taking into account the degree of measurement error implicit in these two measures, the data are not clearly supportive of the hypothesis that the facilitative team was indeed facilitative.

## Conclusions and Recommendations

The most dramatically beneficial effect of the experimental program was apparent in the experimental cognitive group. Here, as had been anticipated, "brighter students" did "blossom when grouped with brighter students." It is likely that a sense of failure was avoided in this group.

In terms of preventing learning disabilities, it would seem that whatever learning disabilities might have arisen out of this group might have been due to the students being understimulated and bored. Thus, losing interest, they could over years lose the ability to learn effectively. It would appear that this situation is less likely to occur with the children from the experimental cognitive group, assuming they are allowed to continue the "blossoming" in later grades.

The benefits derived from the program by the children in the visual-motor and auditory discrimination groups are less clearly defined. It did appear, with certain qualifications, that the program was able to assist them in overcoming their developmental lags to some extent. In terms of their achievement, it appeared that, at least, the program had no detrimental effect, in that they were generally able to attain the same levels of measured achievement as their control groups. However, given certain qualifications, it may have permitted them to learn at a faster rate than their controls.

The measurement of self-concept change which resulted from the experimental procedures, in general showed that the control group made greater gains than did the experimental groups. One possible implication of this finding is that the experimental procedures were detrimental to self-concept change and growth. While other possibilities could have accounted for this finding, such as measurement error, convergence toward a "normal" score range, or teacher effect, the implication for similar programs is sufficient to warrant consideration. It would be recommended that this area be further investigated with the hope that further research, utilizing better measures of self-concept perhaps, would be able to clarify the issue. Lacking such research, future similar programming should give serious consideration to the effect of such procedures on children's self-concepts.

Further research would also be desirable in order to attempt to clarify the suggestions from this study as to the benefits derived by the experimental visual-motor and auditory discrimination groups. Such research would ideally, provide for greater control over the pertinent variables, rather than employing intact groups with somewhat overlapping curricula. Lacking such research it may only be speculated that these groups profited sufficiently from the program. Of course, it would also be desirable to conduct follow-up evaluations of the children involved in this study as experimental and control subjects. Such evaluations, ideally conducted in their first and second grade years would give more definite indications as to the value of the program in preventing learning disabilities.

Although it has often been speculated that the child's home life and situation were important to his success in school, the data of this study were unable to support this idea. The demographic variables were, for the most part, unrelated to the child's achievement, as measured by a standardized test. Further, there appeared to be no relationship between measured maternal attitudes and measured achievement of a small sample of children. However, there are a number of home and family variables which were not assessed in this study which could have relavence, including parental expectations, emotional sta-

bility of the home, value placed upon school learning, etc. Further research, and even replication of these findings, are needed to clarify the relavence of the home to the school situation.

The measures of change in teacher attitudes and effectiveness showed some change in a favorable direction by at least three teachers. It would have been expected that teacher effectiveness, at least, would have shown an increase as a result of the experimental program. This might have come about through the the additional training they received and because of the use of teacher assistants. It is felt, however, that such a change did not occur in terms of the data reported. In part this may be due to a measure of insensativity of the instrument. In part it may have been due to the teachers involved. Initially, these teachers voiced criticism of and resistance to the program. These factors had to be dealt with during the experimental procedures, by the facilitative team--guidance counselor and consulting psychologist. While considerable effort and energy was expended in this manner, it is doubtful that it had a beneficial effect of sufficient degree. The criticisms and resistances diminished in occurrence, but that does not necessarily indicate the complete acceptance of the program by the teachers on a private level.

The classroom teacher is obviously a crucial variable in any kind of school learning. The findings of this study, and their subjective evaluation imply that greater attention must be paid to the teacher variable. In the present study there was a failure on the part of the facilitative team to insure against the criticisms and resistances which became apparent after the onset of the program. In future undertakings of this kind, the training of teachers and handling of their criticisms must be carried out prior to the onset of the experimental procedures. In this manner due consideration can be given to the teacher's point of view, and her cooperation is more likely. Such an approach can also serve as a screening device which would allow a selection of the teachers most likely to succeed with the experimental program. All teachers are not able to function under all conditions. Ideally there should be a match of teacher with classroom procedures.

While the present study suggests that the practice of grouping in kindergarten may be beneficial, and presumably instrumental in preventing learning disabilities, it was not without its shortcomings. Generalization from the present findings should, therefore, be made only with suitable cautions. The study should be replicated with more adequate controls, and/or cross-validated on a different population of children. Furthermore, refined curricula should be devised in order to further maximize the benefits which might accrue to the children involved. It may, nevertheless, be tentatively concluded that by focusing upon the developmental abilities which underlie the ability to learn it may be possible to modify these abilities in the early school years, as Frostig and Maslow suggest (1968).

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Appendix A

MYK Battery and "General Information Record"

## I MYK BATTERY

The MYK Battery is a compilation of tests for the screening of pre-kindergarten children on an experimental basis. The battery was assembled with the following considerations in mind:

1. It is to be used, at least initially, as an experimental battery.
2. It can yield the most significant diagnostic information in the least amount of time and examiner effort.
3. It can be administered by relatively unsophisticated examiners.
4. It involves minimum use of equipment and other materials.
5. It must be easily scored and interpreted even by untrained persons.
6. It must be capable of discriminating between non-problem and problem children with respect to the four catagories below:

   a) general assessment of school readiness of children aged 4 - 6.
   b) identification of early maturing and/or gifted children.
   c) identification of slower maturing children and those with developmental lags.
   d) permit grouping, guidance and curriculum planning for individual children.

Rationale: The various tests which have been assembled are presented as they relate to the various readiness categories of interest.

### 1. Visual-Motor Skills

A. Human Figure Drawings are presented to the child first in order to present a non-threatening, enjoyable task to the child. He is asked to draw three figures--Man, Woman and Self. This type of task provides some low level insights into the child's visual-Motor skills, but more importantly it presents some evidence concerning the child's social and emotional adjustment. There are two methods of scoring drawings for social-emotional maturity--Signs of Maladjustment (Koppits, 1966; and Vane and Eisen, 1962), and Arciculation of Body Concept (Witkin, eta al, 1962; and Faterson and Witkin, 1970).

B. Developmental Designs Scale consists of a series of 18 geometric designs which the child is asked to reproduce in a booklet. These designs were adapted from three similar sources: Beery-Buktenica, Gesell's Developmental Schedules, and the Bender-Gestalt. Each design is scored either: 2, a passing score; 1, a marginal passing score; or 0, a failing score. These scores are summed across the 18 items for a total score. A manual for administration and scoring provides criteria for scoring.

2. Auditory Discrimination

The Auditory Discrimination Test consists of three parts based upon potential errors: initial sounds, final sounds, and final "ed" sounds. Nine words are read aloud to the child while the examiner and the child are back to back. If the child repeats the word correctly he receives credit of one point; nine points for each scale; 27 for the total scale. The Auditory Discrimination Test was constructed with the consultation of an experienced Speech and Hearing specialist. The words chosen were those which the consultant advised were most often misheard by children in the 4-6 year age range.

3. Intellectual Functioning

As a measure of intelligence the Slosson Intelligence Test (SIT) was adopted (Slosson, 1964). This test, like the Stanford-Binet, yields scores for mental age and IQ. Unpublished research with this instrument (Yater, 1968) indicates that the scale is reasonably reliable with this 4-6 age population, and that the SIT consistently overestimates the Stanford-Binet by approximately 8 IQ points.

4. Verbal-Numeric Skills

The V-N Skills Test is an experimental instrument added to the battery to provide additional data concerning: vocabulary; number concepts and numeric expression; and spatial orientation. A set of nine (plus one sample or teaching card) cards are involved. Each card has a set of objects drawn on it, numbering from two to ten. The objects drawn include: locks, rakes, radios, airplanes, zippers, rulers, houses, tables, and boys, (sample has apples). The number of the objects on a given card varies from two radios on one card to 10 rakes on another. Further, one object on each card is upside down (U), one is higher than the others (H), and one is larger (L). The child is shown the cards one at a time and the examiner asks:

a) What are these?
b) How many are there?
c) Show me _____ fingers. (The number given in b is used here even if b was incorrect.)
d) Which one is larger? -- bigger?
e) Which one is higher?
f) Which one is upside down?

For each of the six categories there is a maximum score of 9, i.e., one point for each correct answer. These scores supplement those in the visual-motor and intellectual area.

Enrollment date_____ Grade _____ Teacher _____

Student's name _____ ___ Boy _ Girl
(last name) (first) (middle) (Check

Birth date_____Place of birth_____ Birth Cert. No.____

Father's name _____ Address_____ Phone_____

Father's age_____Occupation_____

Father's business address_____Phone_____

Highest education completed _____

Mother's name _____Address_____Phone_____

Mother's age _____Occupation_____

Mother's business address_____Phone_____

Highest education completed_____

If mother works, who cares for child while she is at work_____

Are child's natural parents: Married___Date_____Separated___Date_____

Divorced___Date_____Deceased: No__Yes: Mother__Date____Father__Date___

Child lives with natural mother__natural father__step-mother__step-father__

Grand-mother__grand-father__ other female relative__, other male relative__

List names and ages of other children in the home

| NAME | AGE |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Has this child attended any pre-school programs such as Head Start___, Day Care___

Nursery___, Other _____

How long has family lived in Jennings? Less than one year_____, two years_____ three years_____, five years_____, over five years_____

From where did the family move to Jennings? rural community_____, small town (under 25,000)_____, town (under 500,000)_____, large city (over 800,000)_____

Is mother RH negative? Yes____ No____

Did mother have German measles or other virus infection during first three mos. of pregnancy? Yes_____ No_____

Were any of the following symptoms noted:

Bleeding: Yes_____ No_____

Swelling of hands or feet: Yes_____ No_____

Kidney infection: Yes_____ No_____

High blood pressure: Yes_____ No_____

Low blood pressure: Yes_____ No_____

Nausea or vomiting: Yes_____ No_____

Was mother required to take any medication during pregnancy? Yes_____ No_____

If so, please list:_____

Medical History of Child

Has child ever had any of the following and, if yes, when:

| | No | Yes | Date |
|---|---|---|---|
| Chickenpox | | | |
| Measles | | | |
| German Measles | | | |
| Infantile Paralysis (Polio) | | | |
| Rheumatic Fever | | | |
| Smallpox | | | |
| Whooping Cough | | | |
| Heart Disease | | | |
| Encephalitis | | | |

| | No | Yes | Date |
|---|---|---|---|
| Diptheria | | | |
| Ear Infection | | | |
| Hepatitis (Jaundice) | | | |
| Mumps | | | |
| Pneumonia | | | |
| Scarlet Fever | | | |
| Typhoid Fever | | | |
| Tuberculosis | | | |
| Tonsillitis | | | |
| Other | | | |

Has child ever had any serious operations? No___ Yes___ If yes, describe _____

_____

Has child ever had any severe burns or injuries? No___ Yes ___ If yes, describe

_____

Has child ever been hospitalized for other than emergency treatment? No___ Yes ___

If yes, describe _____

Has child ever fallen on his head or otherwise suffered any head injuries?

No___ Yes ___ If yes, describe _____

Does your child ever have:

| | No | Rarely | Occasionally | Often |
|---|---|---|---|---|
| Dizzy spells | | | | |
| Faint or lose consciousness | | | | |
| Wet the bed | | | | |
| Nose bleed | | | | |
| Headaches | | | | |
| Difficulty breathing | | | | |
| Colds | | | | |
| Stomach aches | | | | |
| Eating problems | | | | |

If yes, describe _____

Trouble sleeping _____ _____ _____ _____

If yes, describe _____

Ear trouble _____ _____ _____ _____

If yes, describe _____

Does your child have any allergies? No__ Yes__ If yes, explain _____

Does your child have any heart trouble? No__Yes__If yes, explain_____

Has your child ever had contact with tuberculosis? No___ Yes ___

Is this child on any medication for any reason? No___ Yes ___ If yes, explain

_____

Please list any information below which you feel might be helpful for us to know:

_____

_____

_____

Name of child's dentist _____Address _____

Name of child's physician _____Address _____

## Appendix B

### Grade Equivalent Scores of Adjusted Mean WRAT Scores

The grade equivalent scores were obtained by entering tables provided by the Wide Range Achievement Test with the adjusted means of the analyses of covariance for each sub-test. Raw scores were utilized in the analyses in that the grade equivalent scores represent more coarse data which obscures certain degrees of raw scores. The grade equivalents reported below are by group, for each sub-test.

I. Reading Sub-test:

| | VM | AD | C |
|---|---|---|---|
| Experimental | 1.1 | 1.2 | 1.6 |
| Control | 1.1 | 1.2 | 1.2 |

II. Spelling Sub-test:

| | VM | AD | C |
|---|---|---|---|
| Experimental | 1.0 | 1.1 | 1.5 |
| Control | 1.1 | 1.0 | 1.0 |

III. Arithmetic Sub-test:

| | VM | AD | C |
|---|---|---|---|
| Experimental | 1.2 | 1.0 | 2.1 |
| Control | 1.0 | 1.0 | 1.0 |

Appendix C

Form for the Evaluation of Teacher Evvectiveness

The form is an adaptation of the Teacher Evaluation Report formerly used by the School District of Jennings. The adaptation simply involved rearranging the scoring so that a high score represented a more favorable score. A facsimile of the form as used in the study is reproduced below.

Name_____ Date_____

Number of Years Teaching Experience_____

(3) Superior (2) Satisfactory (1) Unsatisfactory

| | | 3 | 2 | 1 |
|---|---|---|---|---|
| A. | Teaching Effectiveness | - | - | - |
| | Knowledge of Subject Matter | | | |
| | Lesson Planning | | | |
| | Use of Varied Materials and Techniques | | | |
| B. | Classroom Management and Supervision | - | - | - |
| | Discipline | - | - | - |
| | Classroom | | | |
| | Building and Grounds | | | |
| | Effective Classroom Environment * | | | |
| C. | Professionalism | - | - | - |
| | Cooperation with Staff | | | |
| | Leadership | | | |
| | Academic Growth | | | |
| | Parent Relations | | | |
| | Student Relations | | | |
| D. | Personal Attributes | - | - | - |
| | Attitude | | | |
| | Initiative | | | |
| | Enthusiasm | | | |
| | Personal Grooming | | | |
| | Punctuality | - | - | - |
| | Arrival Time | | | |
| | Reports | | | |
| | Total Checks | | | |
| | Multiplier | x3 | x2 | x1 |
| | Weighted Scores | | | |
| | Total Score | | | |

Appendix D

Analyses of Variance of Unadjusted Mean Achievement Scores

Below are presented summaries of the analyses of variance computed for each achievement sub-test on the means prior to adjustment for the effect of the covariate index.

I. Reading Sub-test:

| Source | S.S. | df | M.S. | F | p = |
|---|---|---|---|---|---|
| Group | 121.20 | 1 | 121.20 | 1.732 | n.s. |
| Treatment | 1,389.60 | 2 | 694.80 | 9.930 | .001 |
| Interaction | 425.00 | 2 | 212.50 | 3.037 | .05 |
| Error | 8,186.60 | 117 | 69.97 | | |
| Total | 10,122.20 | 122 | | | |

II. Spelling Sub-test:

| Source | S.S. | df | M.S. | F | p = |
|---|---|---|---|---|---|
| Group | 83.20 | 1 | 83.20 | 3.592 | .10 |
| Treatment | 316.00 | 2 | 158.00 | 6.822 | .01 |
| Interaction | 143.40 | 2 | 71.70 | 3.096 | .05 |
| Error | 2,709.20 | 117 | 23.16 | | |
| Total | 3,251.80 | 122 | | | |

III. Arithmetic Sub-test:

| Source | S.S. | df | M.S. | F | p = |
|---|---|---|---|---|---|
| Group | 119.60 | 1 | 119.60 | 5.368 | .05 |
| Treatment | 516.20 | 2 | 258.10 | 11.563 | .001 |
| interaction | 982.60 | 2 | 491.30 | 22.012 | .001 |